Section III: Telecommunications Infrastructure

Glossary of Telecommunications Infrastructure Terms

Access Point. Location on a network where switches or other electronic devices have been installed so that there is access to the network. There are also pricing access points where the network is not actually accessed but the service is priced as if there was physical access to the network at that location. The carrier "backhauls" the service to the physical location point.

Backbone. A high-speed line or series of connections that forms a major pathway within a network. The term is relative as a backbone in a small network will likely be much smaller than many non-backbone lines in a large network.

Bandwidth. The amount of information can be transmitted at one time based on the range of electrical frequencies the end devices on the network can handle.

Broadband Services. Broadband services exceed 200 kilobits per second in both directions. Some experts estimate that in 4 to 5 years, broadband with speeds of 25 to 40 megabits per second will be needed. DSL and cable modems typically provide 1-2 megabits per second. Most of the DSL that is in place is capable of handling 8 megabits per second by changing plug-in cards. DSL equipment is becoming available in two new versions. One version is capable of 20 Mbps and the second is capable of 40 Mbps. Most cable modem systems are capable of 30-40 megabits per second.

Cable Modem Service. High-speed data service received through the cable system. The speed is typically 1-2 Mbit/s, although systems are capable of providing speeds of 30 to 40 Mbps and the distance can be 100 km or even more.

Dark Fiber. Fiber furnished with no termination equipment (i.e., lasers or electronics). Purchasing or leasing dark fiber requires the entity securing the service to invest the capital dollars for the terminating lasers and electronics.

DSL (Digital Subscriber Line). High-speed services provided over copper telephone lines providing voice and data (typically Internet) services. The reach (distance from the main telephone office or any remote line group in the countryside) has ranged from 18,000 route feet to approximately 24,000 route feet. Recently a new vendor product has become available, being deployed in Nebraska, that allows for retrofitting many of the existing DSL lines to achieve a range of over 40,000 feet providing multiple voice lines and data at speeds up to 712 Kpbs in both directions.

Duct. A conduit, usually placed in "bundles" of four or more (depending upon the number the carrier thinks may be needed in the next 20 or so years), through which fiber cable is placed (pulled). Copper cables occupy many older conduits and can be pulled out to make room for fiber and thus gaining significant capacity.

Fiber (Optics). Thin filaments of glass through which light beams are transmitted over long distances carrying enormous amounts of data. Modulating light on thin strands of glass produces major benefits in high bandwidth, low power consumption, small space needs, security, and total insensitivity to electromagnetic interference.

Fiber Cable. The assembling of many thin filaments of glass into a single cable where the bundled glass filaments are then protected by exterior sheathing of polyethylene and sometimes a metal wrap with another sheathing of polyethylene material.

Fixed Wireless Data Service. High-speed services provided over wireless to a fixed location. Often a dish or receiver must be attached to the roof and positioned to face the nearest wireless transmitter.

High-Speed Services. Most consumers consider high-speed services to be anything faster than a dial-up 56 kbps connection. This is the simplest definition and the one that we will use in this workbook. Some people equate the term high-speed services to broadband which is defined by the FCC as faster than 200 Kbps. Others—usually those who have worked with telecommunications for some time—use the term high-speed services to mean speeds faster than a T-1 or faster than 1.544 Mbps.

ISDN (Integrated Services Digital Network). ISDN can typically provide speeds of roughly 128,000 bits per second over phone lines. ISDN is used for videoconferencing and can be more cost effective than having a T-1 line or fractional T-1 for an occasional user of videoconferencing because it is often priced based on hours of use. ISDN is a 2B + D configuration. The "B" channels are 56Kbps and the "D" channel is 16 Kbps. You can configure up to a 23B + D service which would equal a T-1 or 1.544 Mbps.

Mesh Networks. Mesh networks provide redundant connections among access points and eliminates the need to have a connection to the Internet at each access point. The new mesh network equipment is making it more affordable to create WIFI networks.

Mobile Digital Wireless Data Service. Voice and data (e-mail, etc.) can be transmitted to a digital cellular phone, PDA, or laptop equipped with a wireless receiver. WIFI is one of the most popular forms of mobile digital wireless data service.

Voice over Internet Protocol (VoIP). VoIP is the transmission of voice communications over the Internet.

WIFI. WIFI is short for wireless fidelity and refers to any type of 802.11 network which can be accessed by a computer with a wireless networking card.

WiMax. WiMax is a wireless network running the Institute of Electrical and Electronics Engineers Inc.'s 802.16 standard, using licensed and unlicensed radio spectrums. The 802.16d standard, also known as 802.16-2004, can provide line-of-sight communication for up to 30 miles, though in-building coverage is estimated at closer to two miles.

T1. A dedicated connection providing transmission capacity of 1.54 Mbps. A T-1 can be multiplexed into 24 DSO channels. DSO is a 56 Kbps channel—the bandwidth used for voice service. The technical term for a T-1 is a DS-1 where DS stands for Digital Service.

DS-3. Sometimes referred to as a T-3, a DS-3 contains 28 T-1 lines (45 Mbps).

OC-3 (Optical Carrier-3). An OC-3 contains 3 DS-3s (155 Mbps). Note: The math of multiplying the number of T-1s in a DS-3 and the number of DS-3s in an OC-3 does not equate because of bandwidth used for signaling and control of the circuits.

*Roger Hahn from the Nebraska Information Network provided assistance in the development of this glossary. For definitions of additional terms, see the CSPP Readiness Guide Glossary of Terms (**www.cspp.org/projects/readiness/glossary.htm**) or the Glossary of Technical Terms (**www.nitc.state.ne.us/itc/citizens/glossary.htm**). CENIC, the Corporation for Education Network Initiatives in California has some excellent resources, including a glossary of technology terms and a data performance table available in the resource section of their On the Road to Gigabit Broadband Self-Assessment Guide For Communities page at http://www.cenic.org/guide.*

Are high bandwidth services available to all businesses, organizations, and residents?

Does your community have affordable access to telecommunications services? Affordable access and high-speed access are often two different things. Both should be available in a community.

A. This section should be initially completed by an individual or group of individuals designated by the information technology committee to be the section leader(s).

Broadband services and infrastructure factors to assess:	**yes**	**no**	**future actions**
Is the area served by a cellular phone provider?	☐	☐	
Is the area served by one or more national cellular phone providers?	☐	☐	
Is mobile digital wireless data service available? WIFI and WiMax are becoming increasingly available in communities.	☐	☐	
Is high-speed Internet access available in the community? Is cable modem service available? Is DSL available? Is fixed wireless data service available? Is ISDN available?	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	
Is there competition to provide high-bandwidth telecommunications services in the community?	☐	☐	
Are high-bandwidth telecommunications services available in the community at a price that is competitive with prices in other communities?	☐	☐	
Does the local telephone company or the cable company offer Voice over IP?	☐	☐	
There are varying levels of business infrastructure development that a community may have:			
▪ Is there at least one business development area that has infrastructure for high-bandwidth telecommunications?	☐	☐	
▪ Is there a backbone of high-bandwidth infrastructure that can be reached from many places in the community?	☐	☐	
▪ Is high-bandwidth telecommunications infrastructure readily available throughout the entire community?	☐	☐	
Do community leaders talk periodically with private infrastructure providers about plans and needs in serving the local community?	☐	☐	
Do community leaders publicly recognize local technology infrastructure providers and businesses which are bringing cutting edge information technologies to the community?	☐	☐	

Broadband services and infrastructure factors (continued):	yes	no	future actions
Has the community identified 20 biggest users of advanced telecommunications services?	☐	☐	
Has the community inventoried its telecommunications infrastructure assets?	☐	☐	
Has the community inventoried its aggregated demand for telecommunications services?	☐	☐	
Has the community projected the need for broadband services and infrastructure for the next 3 to 5 years? Some experts estimate that in 4 to 5 years, broadband with speeds of 25 to 40 megabits per second will be needed. DSL and cable modems typically provide 1-2 megabits per second.	☐	☐	
Do local governments use their purchasing power to support telecommunications services upgrades in the community?	☐	☐	
Has the community made site visits to "leading edge" communities in the deployment of broadband services and infrastructure?	☐	☐	
Are all new subdivision required to set aside proper telecom right of way?*[1]	☐	☐	
Are developers required to install telecom duct and turn it over to the community?*	☐	☐	
Are all new buildings required to have structured wiring meeting Cat5e/Cat 6 standards?*	☐	☐	
Does the community install duct and/or fiber just before repaving streets?*	☐	☐	
Are light poles with built in mounting brackets for wireless access points being installed when replacing streetlights or putting in new streetlights? The poles can be leased to private sector companies.*	☐	☐	
Do reasonable rights-of-way fees for all telecommunications providers and a simplified application process encourage competition?*	☐	☐	
Has the community invested in telecommunications infrastructure such as duct, fiber, or access points which can be leased to providers?*	☐	☐	
Are light poles with built in mounting brackets for wireless access points being installed when replacing streetlights or putting in new streetlights? The poles can be leased to private sector companies.*	☐	☐	

[1] Checklist items marked with * were drawn from “Telecommunications as Essential Public Infrastructre” by Andrew Cohilll available at http://www.designnine.com/library/docs/telecom_as_infrastructure.pdf.

B. This section should be initially completed by an individual or group of individuals designated by the information technology committee to be the section leader(s).

On a scale of 1 to 4, evaluate your community's telecommunications infrastructure:[2]

1 56k dial-up and cellular phone services are available to all homes and businesses.

2 Some homes and business have cable modem, DSL or fixed wireless service available. Cellular phone services are available to all homes and businesses.

3 Many residences and business have cable modem, DSL or fixed wireless service available. Mobile digital wireless service is available in some locations.

4 All residences and businesses have cable modem, DSL or wireless service available. Mobile digital wireless service is available throughout the community. Satisfaction with broadband services is high.

What are our strengths in the area of telecommunications infrastructure?

What resources and assets are available in the community to address telecommunications infrastructure? What resources and assets are available regionally or in the state?

If you have a question about regulatory issues, contact the Nebraska Public Service Commission (www.psc.state.ne.us). If you have a question about the telephone industry, contact Roger Hahn at the Nebraska Information Network, (402) 434-2100 or e-mail NINroger@alltel.net.

[2] These assessment factors have been adapted from the *CSPP Readiness Guide* (http://www.cspp.org).

What are some ways in which telecommunications infrastructure could be strengthened?

Does a more thorough assessment of this area need to be made? Yes No

C. These questions should be discussed and answered by the entire information technology committee or have community members provide input on these questions at a community forum.

In two to five years, how would you like your community to score in this area?[3]

1 56k dial-up and cellular phone services are available to all homes and businesses.

2 Some homes and business have cable modem, DSL or fixed wireless service available. Cellular phone services are available to all homes and businesses.

3 Many residences and business have cable modem, DSL or fixed wireless service available. Mobile digital wireless service is available in some locations.

4 All residences and businesses have cable modem, DSL or wireless service available. Mobile digital wireless service is available throughout the community. Satisfaction with broadband services is high.

How would you prioritize telecommunications infrastructure development?

1 Low priority
2 Medium priority
3 High priority.
4 Highest priority

[3] These assessment factors have been adapted from the *CSPP Readiness Guide* (http://www.cspp.org).